

What is claimed is:

1. A method for determining instructions for handling a flexible instrument comprising the steps of:
  - parameterizing the flexible instrument according to a plurality of parameters for handling the instrument;
  - determining at least one instrument configuration, wherein the configuration describes at least one parameter; and
  - determining instructions for handling the instrument according to the configuration.
2. The method of claim 1, further comprising determining a digital model of a flexible instrument.
- 15 3. The method of claim 1, wherein the step of parameterizing further comprises determining an instrument length.
- 20 4. The method of claim 1, wherein the step of parameterizing further comprises determining a shaft rotation of the flexible instrument.
- 25 5. The method of claim 1, wherein the step of parameterizing further comprises determining an angle of deflection of a tip of the instrument.
6. The method of claim 1, wherein the step of parameterizing further comprises determining a tool length.
- 30 7. The method of claim 1, wherein the configuration comprises a value for at least one parameter.

8. The method of claim 7, wherein the configuration describes the handling of the instrument that results in docking the tool with the target.

5 9. The method of claim 7, wherein the configuration describes at least one parameter that docks the flexible instrument with a target.

10. The method of claim 1, wherein at least one parameter 10 of the configuration is determined relative to an anatomical landmark.

11. The method of claim 1, further comprising the step of determining a patient model.

15 12. A method for determining instructions for handling a flexible endoscope comprising the steps of:  
parameterizing the flexible endoscope according to a plurality of parameters for handling the endoscope given a desired task;  
determining, pre-operatively, at least one endoscope configuration of the parameters, based on a predetermined patient model; and  
determining instructions for handling the endoscope 25 according to the configuration.

13. The method of claim 12, further comprising determining a digital model of a flexible endoscope.

30 14. The method of claim 12, further comprising the step of registering a patient to the predetermined patient model.

15. The method of claim 12, further comprising the step of identifying a mutual landmark visible in a patient and in the predetermined patient model.

5 16. The method of claim 12, further comprising the step of determining a configuration relative to a landmark.

17. The method of claim 15, wherein the landmark is a carina of a tracheobronchial tree.

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18. The method of claim 12, wherein the step of parameterizing further comprises determining an endoscope model length parameter.

15 19. The method of claim 18, further comprising the steps of:

inserting the endoscope model to a landmark; and  
inserting the endoscope model to a target site,  
wherein a distance to the target site from the landmark is  
20 a difference between a total distance from a reference  
point to the target site and an intermediate distance from  
the reference point to the landmark.

20. The method of claim 12, wherein the step of  
25 parameterizing further comprises the step of determining a shaft-rotation of the endoscope according to a landmark.

21. The method of claim 20, wherein determining a shaft-  
rotation comprises determining an angle between a bending  
30 plane of a tip of the endoscope model and the target.

22. The method of claim 12, wherein the step of parameterizing further comprises the step of determining a bending angle of the endoscope.

5 23. The method of claim 22, wherein determining the bending angle comprises the steps of:

approximating a bending movement by a semi-circle with a given center;

10 determining a first vector between the center and a tip of the endoscope model;

determining a second vector between the center and the target; and

determining the angle between the first vector and the second vector.

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24. The method of claim 12, wherein parameterizing further comprises the steps of:

determining a tool length; and

20 determining a distance between a tip of the instrument and the target.

25. The method of claim 24, wherein determining the tool length comprises determining the distance between an aligned tip of the endoscope model and the target.

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26. A system for monitoring the configuration of a flexible instrument comprising:

an endoscope comprising a wheel and wheel angle-scale for determining a tip deflection of the endoscope;

30 a stopper fixed to a shaft of the endoscope;

a pointer fixed to the shaft of the endoscope; and

a mouth-piece comprising an angle-scale, wherein the angle-scale is a reference point for the pointer for determining a shaft-rotation.

5 27. The system of claim 26, wherein the stopper is fixed to a position on the shaft according to a distance from the mouth-piece to the target site.

10 28. The system of claim 26, wherein the shaft passes through the mouth-piece.